

## PATENT ABSTRACTS OF JAPAN

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### (54) POLYESTER FILAMENT AND TEXTILE PRODUCT USING THE SAME

#### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a polyester-based filament providing a stable color tone, not producing a waste liquid by dyeing, not discharging a load in the environment by adding a dye, etc., to a polyester containing a fixed amount of a recycled polyester-based resin and subjecting the polyester to melt spinning.

SOLUTION: This polyester-based filament comprises a polyester resin containing  $\geq 50$  wt.% of a recycled polyester-based resin (preferably  $\geq 95$  wt.% ethylene terephthalate content) such as a PET bottle for a liquid food and drink and is obtained by adding a dye and/or a pigment such as carbon black to the resin and subjecting the resin to melt spinning. Preferably the polyester-based filament contains germanium element and a benzoxazole-based fluorescent brightener as a colorant and a textile product is produced by using the polyester-based filament.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the polyester system filament yarn for the object for garments, or industrial materials. It is related with the textiles using the polyester system filament and it which were colored colored or fluorescence white by containing especially recycle polyethylene terephthalate (PET) resin, and making a color or/and a pigment contain at the time of melt spinning.

[0002]

[Description of the Prior Art] From the former, in case melt spinning of the polyester system filament yarn is carried out, the filament yarn colored colored or fluorescence white is manufactured by adding the polyester system resin already mixed [ pigment / of colored or fluorescence white / the color and/or pigment ] by polyester system resin in the color and/or pigment of direct, colored, or fluorescence white.

[0003] It is important to, use namely, recycle again the polyester resin by which the molding activity was carried out once in the PET bottle for liquid eating-and-drinking articles etc. on the other hand as part of corporate activity gentle to the earth environment of contributing to recycle of a resource. As one of the products with which this recycle PET attracts attention, there is polyester filament yarn by remelting and spinning, and this is used for the garments application or the industrial materials application.

[0004] In these applications, polyester filament yarn produces the need of raising the case where coloring is needed, and white degree, by the purpose for spending.

[0005] When such, dyeing using water as a solvent has so far been performed by the color of colored or fluorescence white in the condition of having considered as the condition or textile of filament yarn.

[0006] However, in order to perform dyeing of filament yarn or a textile, a lot of colors and chemicals are used and the waste fluid produced in the case of dyeing has become a big load to the environment.

[0007] Moreover, Recycle PET has large dispersion from the collecting method in physical properties, such as melt viscosity, molecular weight distribution, white degree, and degree of crystallinity, when the filament yarn obtained by carrying out spinning of the polyester system resin which contains recycle PET as a principal component by not being what was stabilized not much by lot-to-lot physical properties is dyed by the textile with yarn, produces an irregular color within a product, or has the problem which produces the color difference in lot-to-lot.

[0008]

[Problem(s) to be Solved by the Invention] The various troubles in said conventional technique are solved, a useful thing is obtained on earth environment as a recycle polyester filament, and it is not influenced by the variation in the physical properties of recycle PET, but the stable color tone is acquired, and moreover the waste fluid by dyeing is not generated, but this invention makes it a technical problem to offer the filament yarn which does not give a load to an environment.

[0009]

[Means for Solving the Problem] The 1st of above-mentioned The means for solving a technical

problem, i.e., this invention It is the polyester system filament which consists of resin which contains recycle polyester system resin 50% of the weight or more. It is the polyester system filament characterized by being obtained by making a color and/or a pigment contain and carrying out melt spinning. The 2nd is a polyester system filament according to claim 1 whose recycle polyester system resin is a PET bottle for liquefied eating-and-drinking articles. The 3rd is claim 1 which contains a germanium element in a polyester system filament, and a polyester system filament given in two. The 4th is a polyester system filament according to claim 1 on which recycle polyester system resin contains ethylene terephthalate 95% of the weight or more. The 5th is a polyester system filament according to claim 1 whose pigment is carbon black. The 6th is a polyester system filament according to claim 1 which the benzoxazole system fluorescent brightener contains as a color material in the polyester system filament, and the 7th is the textiles which used the polyester system filament according to claim 1.

[0010]

[Embodiment of the Invention] The recycle PET contained in the polyester system filament yarn in this invention is more than 50wt%. That it is more gentle to earth environment can guess easily a product including as many recycle PET as possible. Moreover, generally it is not considered that it is the "recycle article activity" product which is using recycle PET only less than [ 50wt% ] into a product. from a viewpoint which uses recycle PET and contributes to earth environmental protection -- desirable -- more than 80wt% -- it is more than 95wt% still more desirably.

[0011] In addition, "recycle" article in this invention means the resin collected in order to fabricate again, without being returned to low-molecular, after being fabricated by forms other than pellets, such as a PET bottle for liquid eating-and-drinking articles, and a film, fiber.

[0012] Moreover, as polyester system resin other than the recycle PET contained in the polyester system filament yarn in this invention, polyethylene terephthalate resin and the resin which used one or more isophthalic acid, 5-sulfoisophtharate metal salt, phosphorus-containing compounds, butylene glycols, and propylene glycols as a copolymerization component of this are mentioned, for example. As long as it can carry out spinning to filament yarn especially after mixing with recycle PET although a polyethylene terephthalate homopolymer is desirable, it is not limited to this.

[0013] Although carbon black, a phthalocyanine, etc. are mentioned as for example, a colored pigment and a benzoxazole system compound etc. is mentioned as a fluorescence white color, the color and pigment which are added to the polyester system filament yarn in this invention are not limited to especially this, but if they are not the object which causes decomposition and discoloration in the case of the melt spinning of polyester system resin, a well-known color and a well-known pigment can be used for them.

[0014] As an industrial materials application, although the polyester system filament yarn in this invention can be used for a rope, a fishing net, a hose, a safety net, a saposhnikovia root network, a sand-proof network, a \*\*\*\* network, the textiles for engineering works, the sheet for engineering works, the textile for tarpaulins, etc., it is not limited to this. Moreover, as applications, such as garments, although it can be used for products, such as a cutter shirt, a blouse, a handkerchief, a working uniform, and a school hat for children, it is not limited to this.

[0015] In the range which does not deviate from the meaning of this invention, additives, such as an antioxidant, an ultraviolet ray absorbent, light stabilizer, lubricant, an antistatic agent, a bulking agent, a cross linking agent, and a nucleating additive, can be blended and used for the polyester system filament yarn of this invention.

[0016] The polyester system filament yarn of this invention can make color regularity, when a color and/or a pigment carry out fixed concentration content. A master pellet is created. as a manufacturing method, it is a certain constant-rate \*\*\*\* about a color and/or a pigment -- Although the method of performing melt spinning is mentioned mixing the blend object of this, a recycle PET pellet and a recycle PET pellet, and an intact polyester system resin pellet at the rate of a constant ratio so that the content of recycle PET may become more than 50wt% As long as polyester system resin can be made to contain a fixed color and/or a fixed pigment, without being limited to this, a well-known manufacturing

method can be used.

[0017] Furthermore, by considering as the cut fiber of suitable die length, the polyester system filament yarn obtained by doing in this way can be used with a gestalt like cotton, or this can also be used for it as spun yarn.

[0018] It is desirable that germanium is contained in the polyester system filament yarn in this invention as an element. Moreover, it is desirable to use the PET bottle for liquid eating-and-drinking articles as recycle polyethylene terephthalate system resin. As a supply source of Recycle PET, the PET bottle used for liquid eating-and-drinking articles occupies big specific gravity. It is kind to earth environment to make this into recycled resources. Generally, although PET is using it except germanium for a catalyst as an element, the PET which constitutes the PET bottle for liquid eating-and-drinking articles uses germanium for a catalyst as an element in many cases. From this, germanium will be contained in the polyester system filament resin which used Recycle PET as an element.

[0019]

[Example] This invention is explained based on an example below. Especially this invention is not restricted by the example. In addition, the measuring method used in the example is as follows.

[0020] (Intrinsic viscosity) It measured at 25 degrees C by using orthochromatic chlorophenol as a solvent using the Ostwald mold viscometer.

[0021] (Tensile strength) According to JIS L 1013, it measured by part for grip spacing [ of 100mm ], and speed-of-testing/of 100mm.

[0022] (Elemental analysis) It measured using the fluorescent X-ray method.

[0023] (Example 1) Polyethylene terephthalate base chip of intrinsic viscosity 0.63 The content of carbon black the polyethylene terephthalate master chip resin which contains carbon black in what used the blender and mixed the recycle PET 120 section of intrinsic viscosity 0.60 in the 100 sections It mixed so that it might become the three sections, and the melting mixing extruder was supplied, and melt spinning was performed. The cooling wind was sprayed, it cooled and the line of thread breathed out from the mouthpiece was solidified, and it took over, giving oils, it extended after that, and the full oriented yarn was obtained.

[0024] (Example 2) Polyethylene terephthalate base chip of intrinsic viscosity 0.63 The content of a phthalocyanine the polyethylene terephthalate master chip resin which contains a phthalocyanine in what used the blender and mixed the recycle PET 120 section of intrinsic viscosity 0.60 in the 100 sections It mixed so that it might become the three sections, and the melting mixing extruder was supplied, and melt spinning was performed. The cooling wind was sprayed, it cooled and the line of thread breathed out from the mouthpiece was solidified, and it took over, giving oils, it extended after that, and the full oriented yarn was obtained.

[0025] (Example 3) Polyethylene terephthalate base chip of intrinsic viscosity 0.63 To what used the blender and mixed the recycle PET 120 section of intrinsic viscosity 0.60 in the 100 sections, it is a benzoxazole system fluorescent brightener. alumnus's1 content the polyethylene terephthalate master chip resin containing East Bright alumnus1 (made in Eastman Chemicals) It mixes so that it may be set to 300 ppm, and a melting mixing extruder is supplied, and melt spinning is performed. The cooling wind was sprayed, it cooled and the line of thread breathed out from the mouthpiece was solidified, and it took over, giving oils, it extended after that, and the full oriented yarn was obtained.

[0026] These polyester system filament yarn was able to obtain the thing of single color, without producing color nonuniformity in the same batch. Moreover, the color difference was not seen in lot-to-lot [ from which the lot of a recycle PET pellet is changed and the obtained polyester system filament yarn differs also in what carried out spinning ]. Furthermore, germanium was not detected by the base chip although germanium was detected as an element from the recycle PET and the obtained polyester system filament yarn of a raw material.

[0027] (Example 1 of a comparison) Polyethylene terephthalate base chip of intrinsic viscosity 0.63 Supply what used the blender and mixed the recycle PET 120 section of intrinsic viscosity 0.60 in the 100 sections to a melting mixing extruder, it is made to breathe out from a mouthpiece, and melt spinning is performed. The cooling wind was sprayed, it cooled and the line of thread breathed out from

the mouthpiece was solidified, and it took over, giving oils, it extended after that, and the full oriented yarn was obtained.

[0028] The obtained polyester system filament yarn is made into the textile of a round braid, and they are Dianix Black BG-FS 200%(made in die SUTA Japan)6% owf, and dispersant DISUPA VG (product made from Akinari Chemical industry). 1.0 g/l, acetic acid 0.1 g/l, sodium acetate The conditions for 30 minutes dyed black at 130 degrees C using 0.6 g/l.

[0029] (Example 2 of a comparison) About the non-dyed round-braid textile of the ester system filament yarn obtained in the example 1 of a comparison, they are Dianix Blue.UN-SE 1.0(made in die SUTA Japan) % owf, Dianix Yellow UN-SE 200%(made in die SUTA Japan)0.5% owf, dispersant DISUPA VG 1.0 g/l, and an acetic acid. 0.1g [ l. ] /, sodium acetate The conditions for 30 minutes dyed green at 130 degrees C using 0.6 g/l.

[0030] (Example 3 of a comparison) About the non-dyed round-braid textile of the ester system filament yarn obtained in the example 1 of a comparison, they are Hakkol STR NW(Showa Chemical Industry Co., Ltd. make)0.4%owf, dispersant DISUPA VG 1.0 g/l, and an acetic acid. 0.1 g/l, sodium acetate It dyed using \*\*\*\*\* for 30 minutes using 0.6 g/l at 120 degrees C.

[0031] As for these polyester system filament yarn, color nonuniformity was seen in the same batch. Moreover, the color difference was seen also in lot-to-lot [ from which the lot of a recycle PET pellet is changed and the obtained polyester system filament yarn differs also in what carried out spinning ].

Moreover, germanium was not detected by the base chip although germanium was detected as an element from the recycle PET and the obtained polyester system filament yarn of a raw material. Furthermore, although the rates of dust collecting of a color are 99% (example 1 of a comparison), 98% (example 2 of a comparison), and 95% (example 3 of a comparison) and not much not being remained, without using a color into dyeing waste fluid, in order for a dispersant, a dyeing assistant, etc. to remain into waste fluid, to make dyeing complete and to perform other drugs processings, waste fluid arose.

[0032]

[Effect of the Invention] as mentioned above, the ester filament yarn of this invention -- recycle PET -- containing -- the earth -- it is environment-friendly, and is not influenced by the variation in the physical properties of recycle PET, but the stable color tone is acquired, and moreover the waste fluid by dyeing is not generated, but it has the effectiveness of not giving a load to an environment.

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CLAIMS

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[Claim(s)]

[Claim 1] The polyester system filament which is a polyester system filament which consists of resin which contains recycle polyester system resin 50% of the weight or more, and is characterized by being obtained by making a color and/or a pigment contain and carrying out melt spinning.

[Claim 2] The polyester system filament according to claim 1 whose recycle polyester system resin is a PET bottle for liquefied eating-and-drinking articles.

[Claim 3] Claim 1 which contains a germanium element in a polyester system filament, and a polyester system filament given in two.

[Claim 4] The polyester system filament according to claim 1 on which recycle polyester system resin contains ethylene terephthalate 95% of the weight or more.

[Claim 5] The polyester system filament according to claim 1 whose pigment is carbon black.

[Claim 6] The polyester system filament according to claim 1 which the benzooxazole system fluorescent brightener contains as a color material in the polyester system filament.

[Claim 7] The textiles using a polyester system filament according to claim 1.

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[Translation done.]